

# Getting Started With 3D Printing



# Goals

1. You'll know more about 3D printing
2. You'll be inspired to make things
3. You'll know how to start
4. You'll be confident in using this new tool

# Why in the library?

**ACCESS**

for everyone on campus

**&**

**LITERACY**

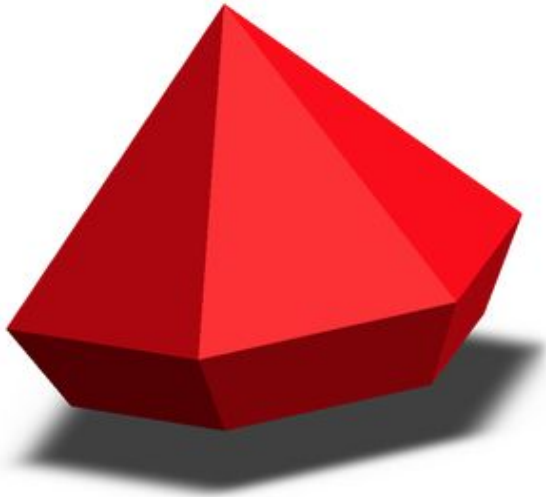
learning new technologies  
and new ways of making things

# What is 3D Printing?

a video from



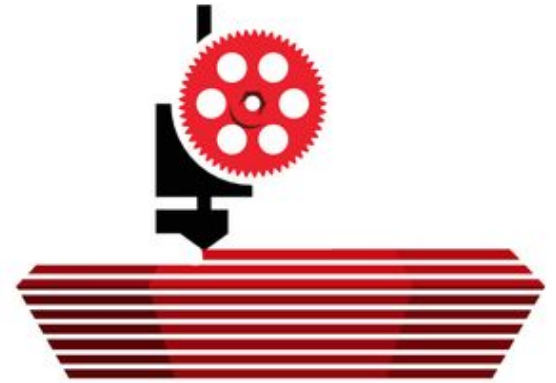
# Digital to Physical



**Digital  
Model**



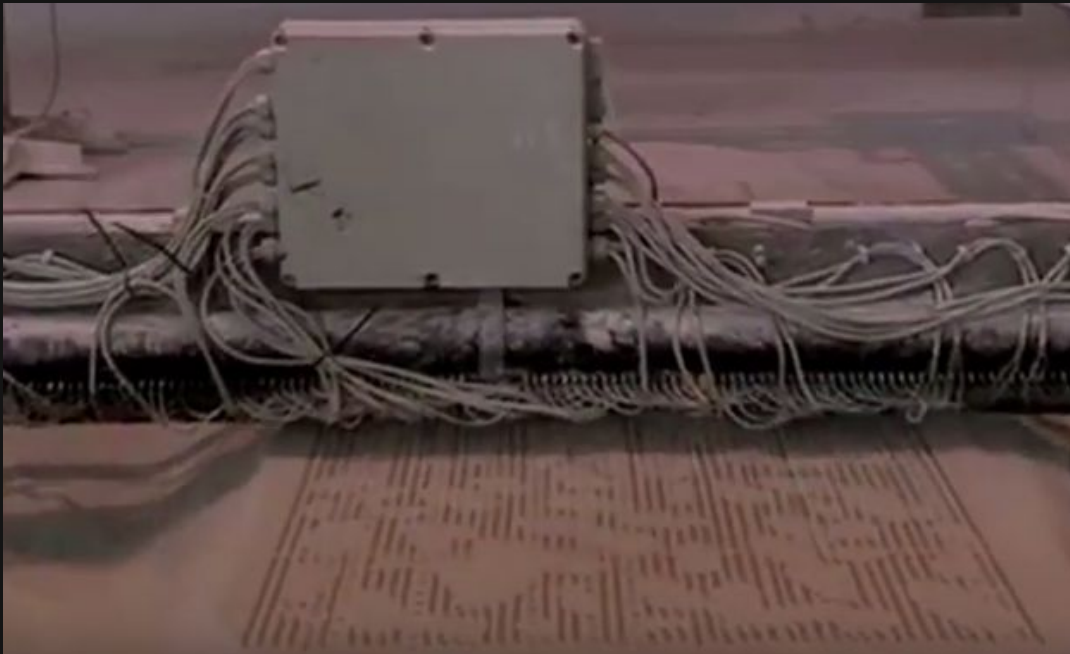
**Sliced in  
Software**



**Printed**

# Materials & Processes

**Industrial  
Powder/Plaster**



**Metals**

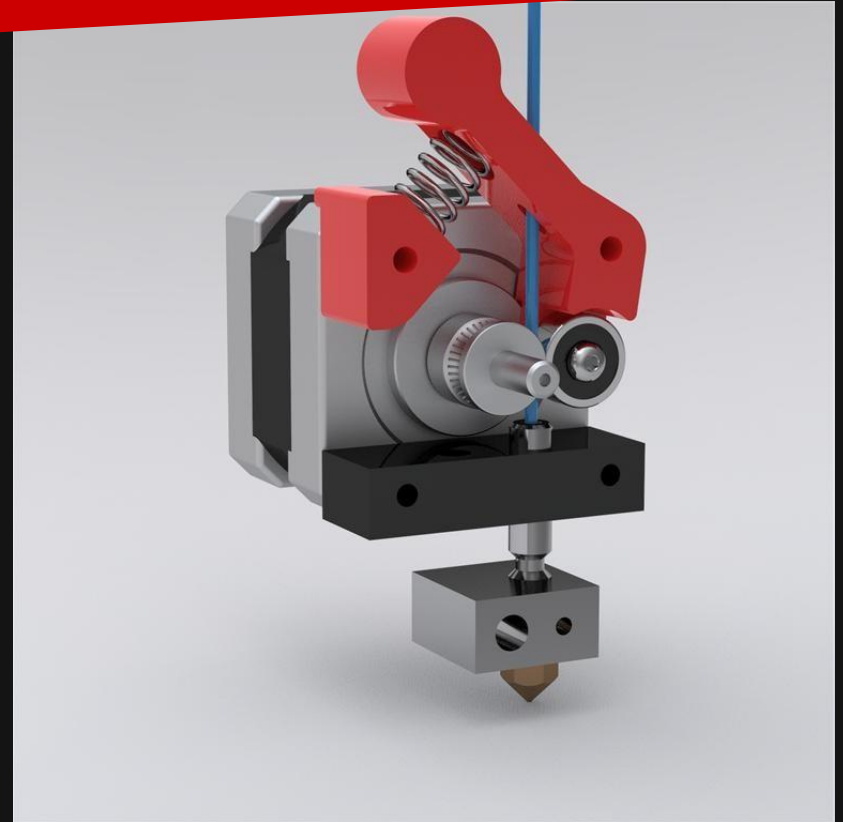


**Multimaterial**

# Our Materials & Process



**Plastic filament  
(PLA, ABS, etc.)**



**Extrusion/  
Melting**

# Our Printers

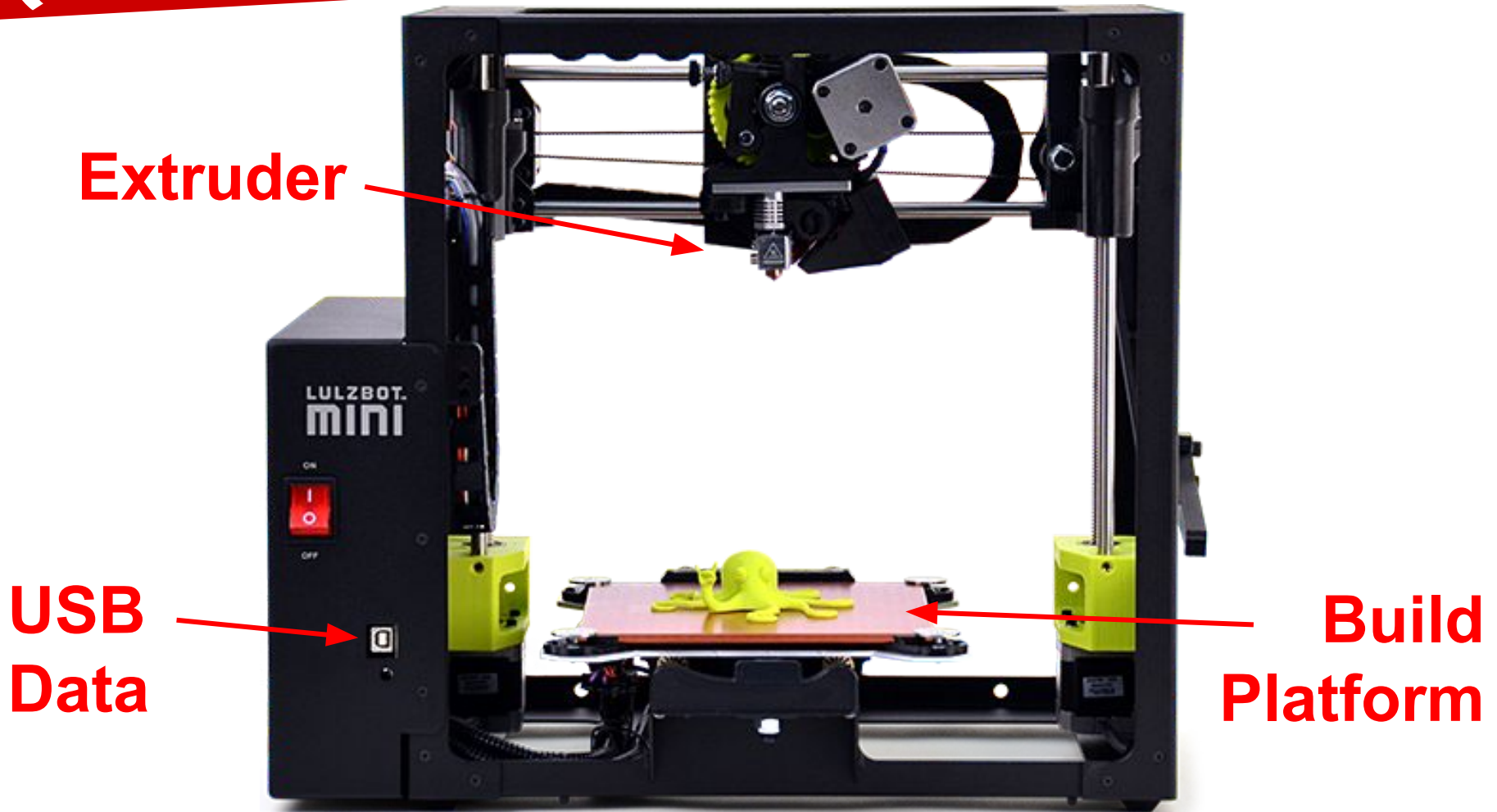
## LulzBot Mini

- Cost: \$1250
- Open filament system
- Robust hardware
- Open Source Hardware





# Anatomy of a 3D Printer (Front)



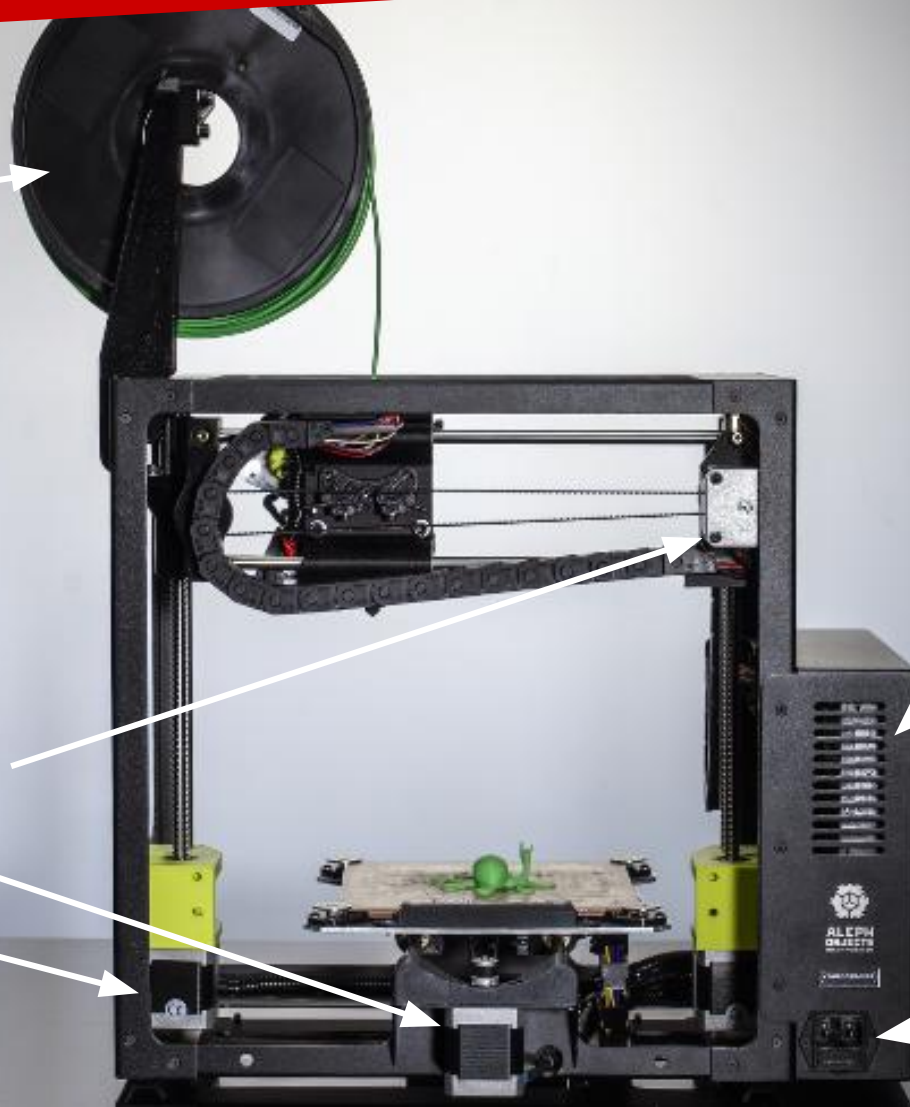
# Anatomy of a 3D Printer (Back)

Filament

Controller  
Board  
(hidden)

Motors X  
Z Y

Power



# 3D Printing Safety

**Risks:** fumes, burns & cuts

## Safety Guidelines

- Fumes → use vents
- *Burns* → Don't touch nozzle or plate, wear gloves
- *Cuts* → Take care removing prints and supports, wear gloves

# Protective Equipment

**Vents**



**Glasses**



**Gloves**



# Let's Print!

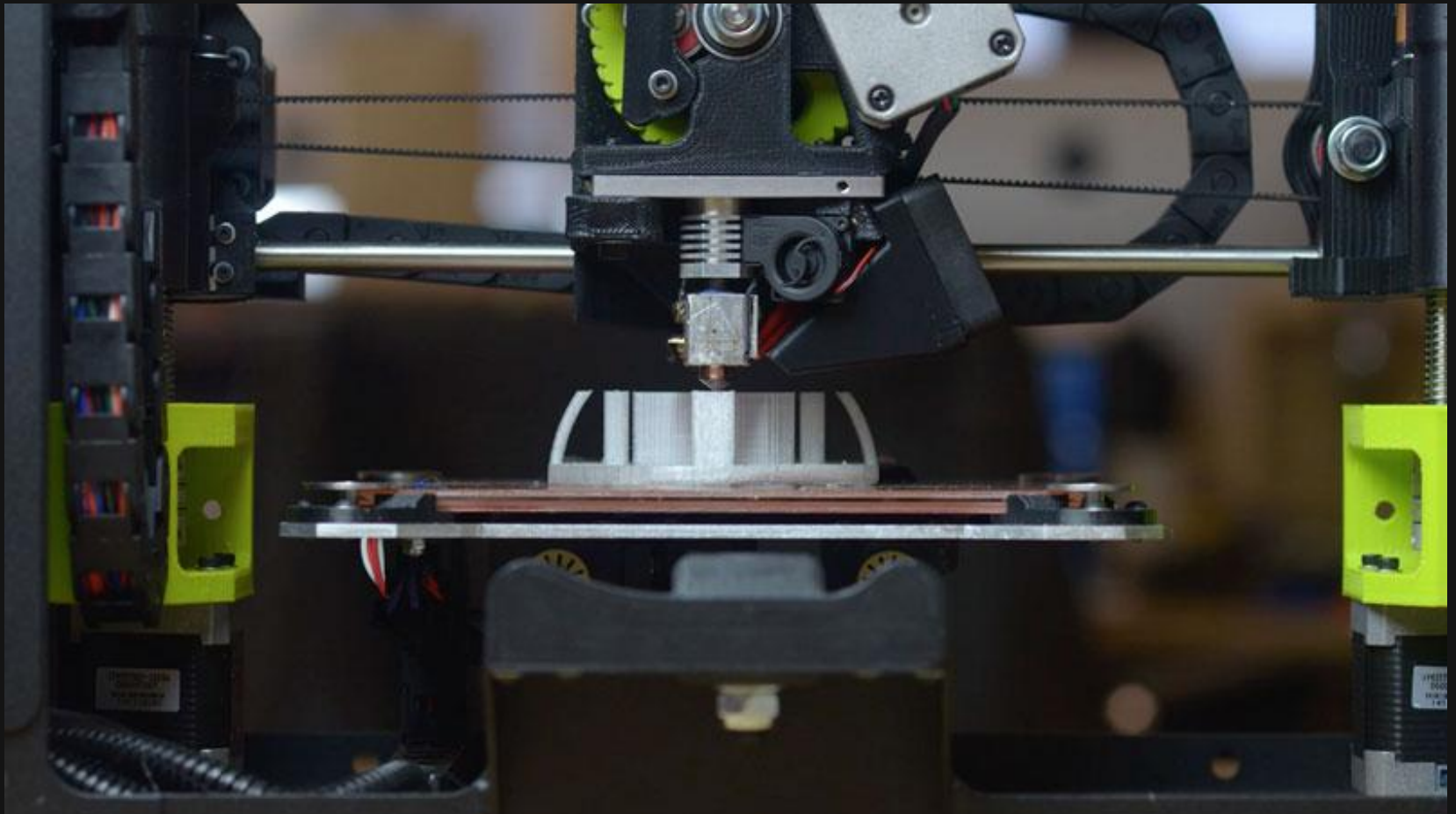


Image courtesy of [www.viget.com](http://www.viget.com)

# How to 3D print

1. Getting a 3D file
2. Setup
3. Printing
4. Post-Processing



# Step 1: 3D Files

## 3 Ways to a Printable File (STL)

- Download (*easiest*)
  - Scan (*hardest*)
  - Design (*coolest*)

# Download (Thingiverse)

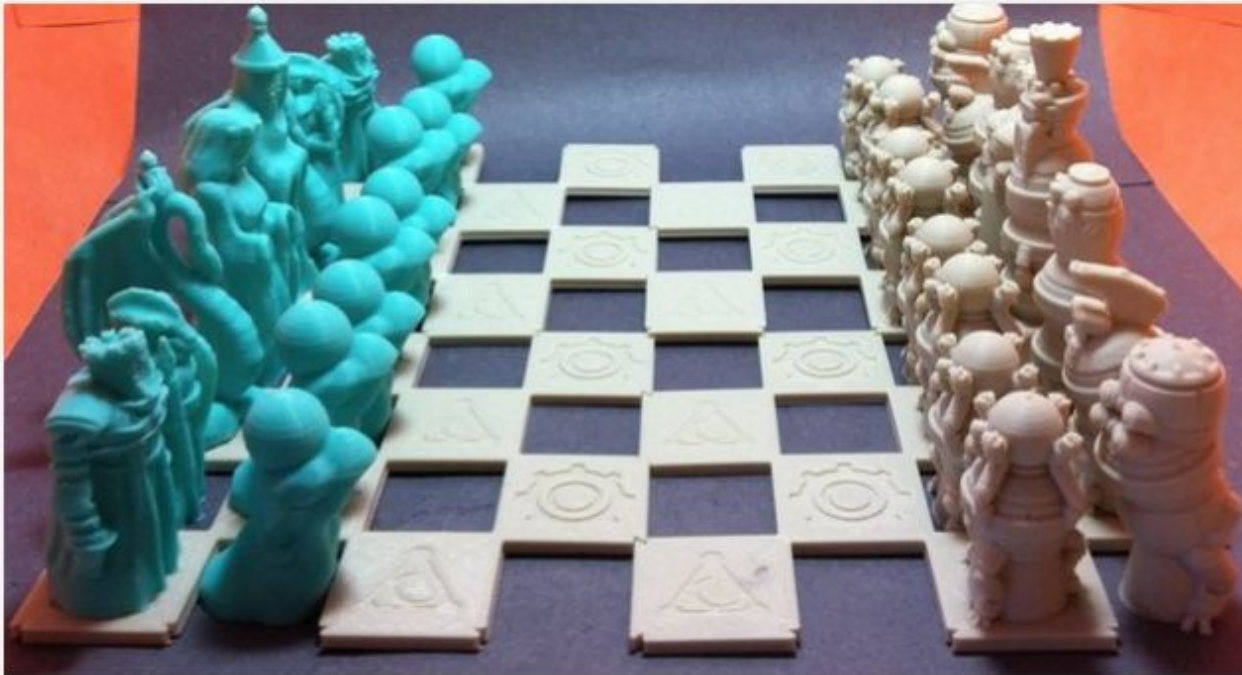
MakerBot Thingiverse

DASHBOARD

EXPLORE

CREATE

Q Enter a search term



## Thingiverse Featured

Dutchmogul's Robots Verses Wizards Chess Set pits two powerful forces against each other. Print it today and discover who comes out on top.

### Global Feed

Latest Thingiverse Activity

### Featured Collections

Download and print today

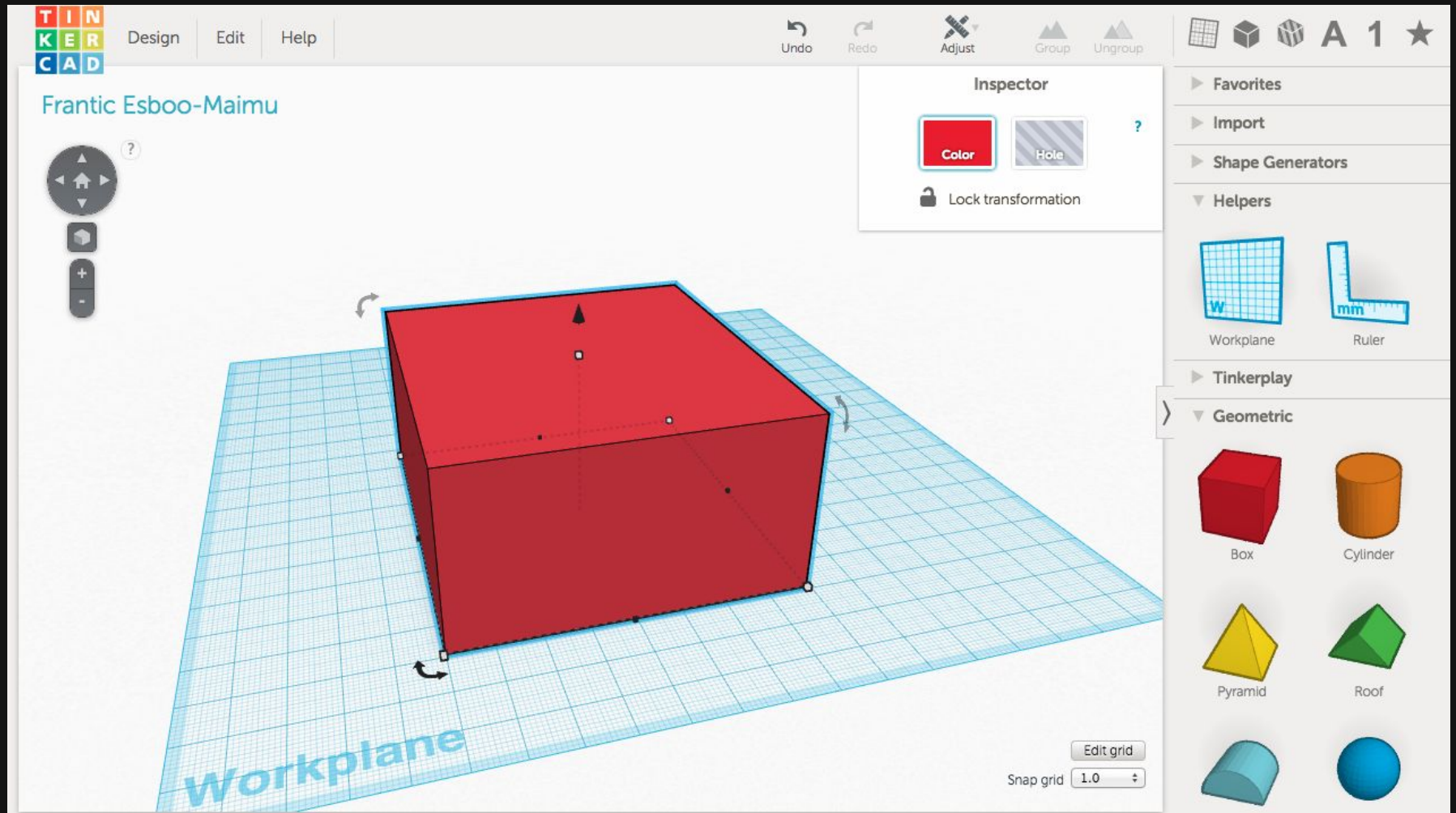
see more >



# 3D Scan (Structure+iPad)



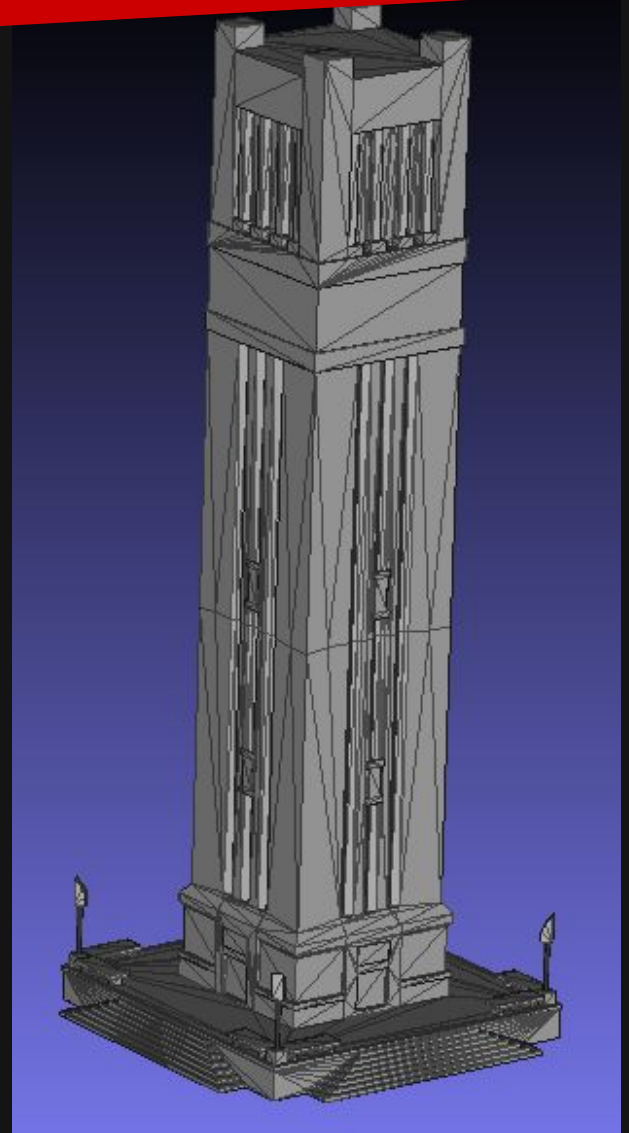
# 3D Design (Tinkercad)



# Now you have an STL\*



*\*STL: Standard  
Tessellation Language*



# Step 2: Setup



## 1. *Cura LulzBot Edition*

The printers should already be set up in the software.

## 2. Load Model

## 3. Click on model

## 4. Rotate/Scale/Move (DEMO)

# Print Settings

- *Material: PLA*
- *Use a Quickprint Profile!*
  - Quality vs Speed:
    - Standard
    - High Speed
    - High Detail
- *Support*
- *Brim*

Material ease of use:

Beginner

Material:

PLA (eSUN)

[Material Information](#)

Select a quickprint profile:

☒ Standard

☐ High speed

☐ High detail

Other options:

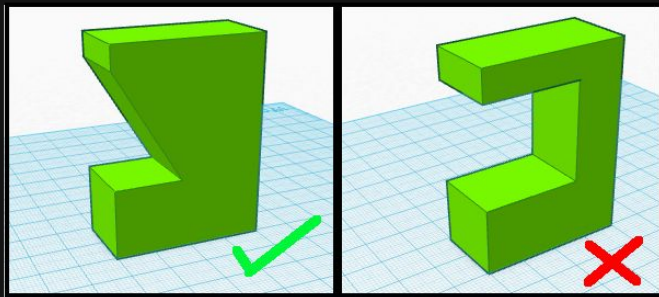
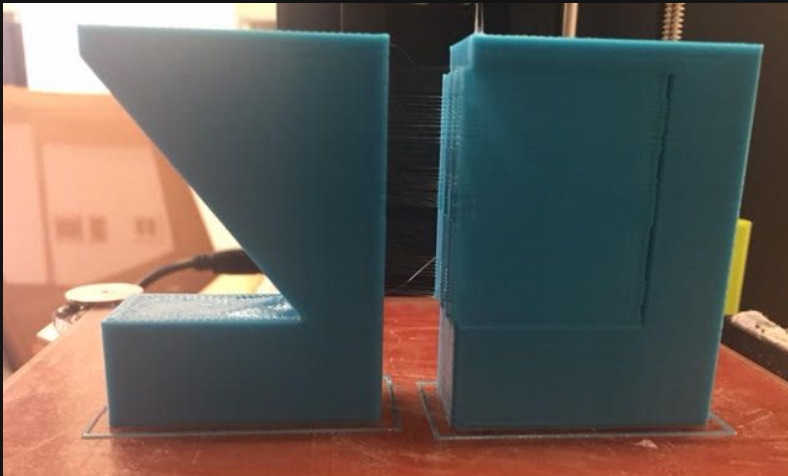
☐ Print support structure

☐ Print brim

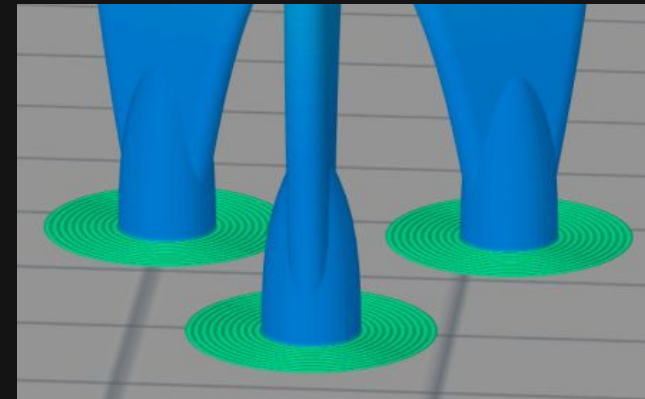
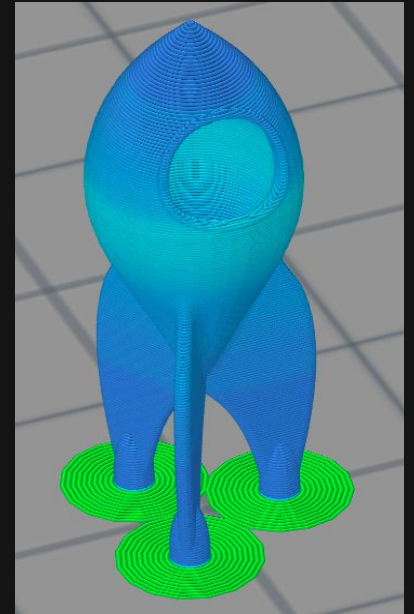


# Print Settings

## Support Material



## Brim



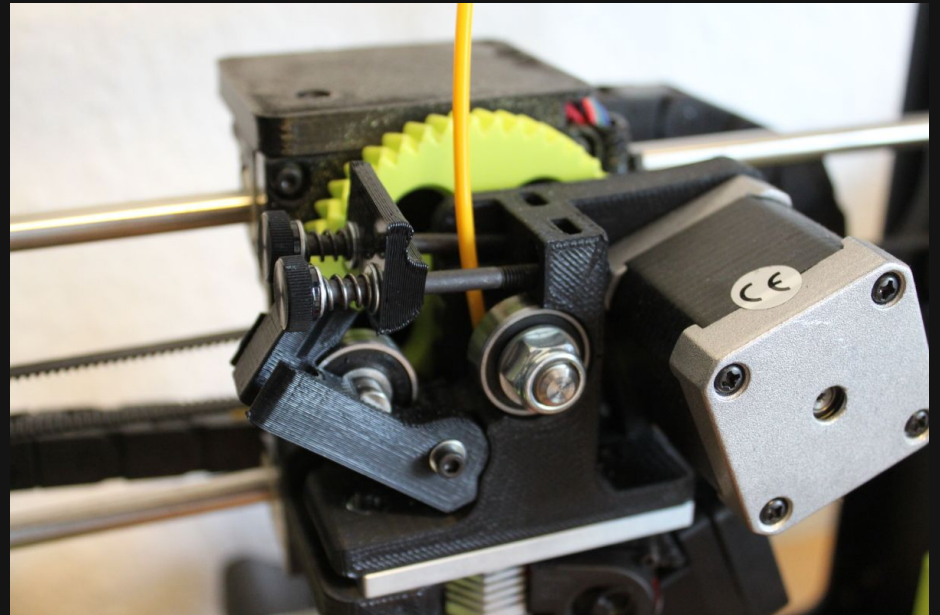
# Filament!

- PLA?
- Filament = type of plastic, color
- 3mm! Different widths for different machines
- Costs
  - Here at Hill
  - .5 kg \$13.25
  - 220 g \$10.25



# Load Filament

- Load filament (DEMO)
  - **Cura:** Control>Connect>  
Set temperature (205°C), insert filament and lock into place, extrude filament, set manual cool down temperature (150°C), clean off extruder (170°C), and now...





# Step 3: Printing

- Prep print surface
  - **LulzBot:** automatic, no prep needed
- Click Print!
- Watch the first layer!



# Step 4: Post-processing

- Print completes! Wait for build plate to cool.
- Remove model from build plate
  - **Toolkit:** gloves! spatula, water bottle
- Clean up your model
  - Remove supports (pliers, cutters)
  - Sand & smooth (sandpaper, files)
- Test, Iterate, & Explore!
- Clean up your workspace

# 3D Printing in the Libraries

## Hill



- Do-It-Yourself
- Easy to Learn Tools
- Lower Cost

## Hunt



- 3D Print Service
- Advanced Capabilities
- Higher Cost

# How to 3D Print at Hill

*Attend an Orientation to get access!*  
*Bring:*



**NCSU ID**



**File to Print  
OR  
Ideas!**



**Buy our Filament with AllCampus  
or Bring your own**

# Hunt 3D Print Options



**Lulzbot Taz 6**



**uPrint**



**Form 2**

# How to 3D Print at Hunt

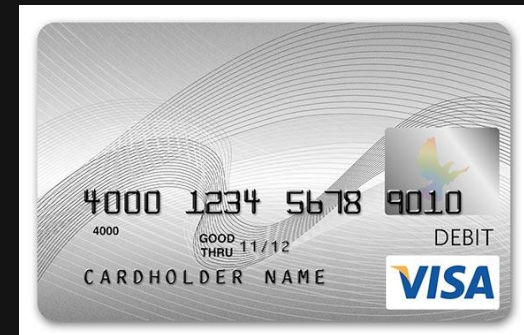
*Visit Hunt Makerspace during open hours. Bring:*



**File to Print  
(STL format)**



**NCSU ID**



**Credit/Debit**

# More to Explore...

- **Materials (e.g., Ninjaflex, Nylon)**
- **3D Design**
- **3D Scanning**
- **and more...**

**Thanks for coming!**

**[www.lib.ncsu.edu](http://www.lib.ncsu.edu)**



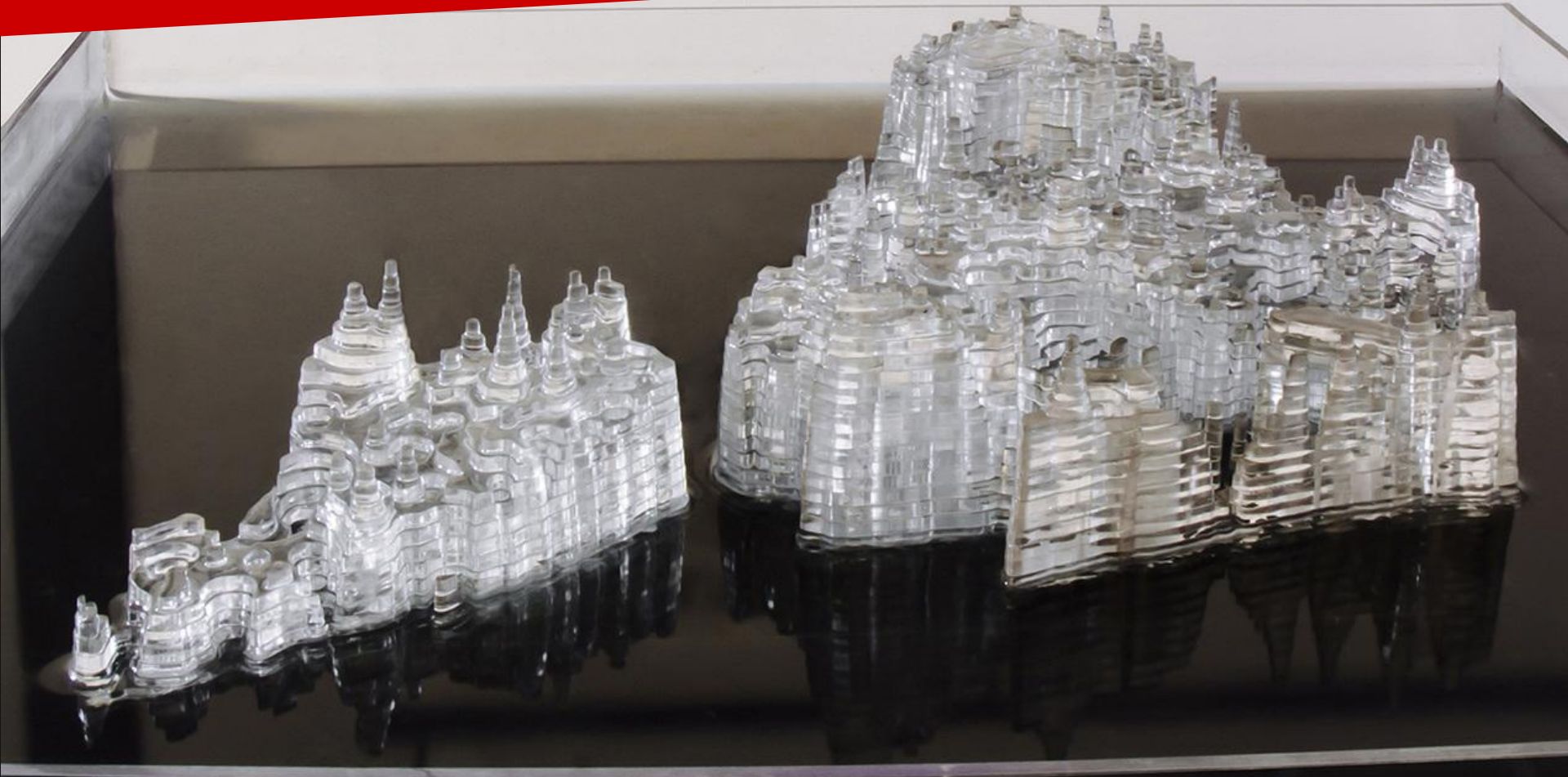
# Setup Notes

- Sign on table(s) saying *Reserved 1-3pm for Workshop*
- Printers, plugged into power, no filament loaded
- Computers, opened up, STL file on Desktop
- Filament to use

# 3D Printing Dataviz



# 3D Printing Dataviz



*Ekene Ijeoma, Wage Islands*